

# STA 2102: INFORMATION TECHNOLOGY FOR STATISTICS

## a) Course Purpose.

At the end of this course the student should be able to perform basic tasks on a computer and use standard software and hardware.

## b) Learning Outcomes

1. Describe the role of information technology and computers in today's society.
2. Describe the fundamentals of computer operations.
3. Describe the basics of computer hardware and software.
4. Construct data files.
5. Determine the different means of disk storage.
6. Use the different number systems and bases and apply the concepts in the four basic operations.
7. Use word processors.
8. Solve computational and records problems using Microsoft Access and spreadsheets.
9. Use the different facilities of networking including the internet.

## c) i) Course Description.

- i) Information technology and computers : fundamentals, classification, data, bit, bytes
- ii) Computer hardware : input, output, storage devices and CPU (central processing unit).
- iii) Computer software : systems software, operating systems, compiling systems, and

application software.

- iv) Data files : random and sequential.
- v) Disk storage : track, sector, cluster and surface.
- vi) Numbers : integers, real, binary, Octal, hexadecimal, and modulo algebra, and the four basic operations, information technology
- vii) ~~Information technology in our society.~~ Information technology in our society.
- viii) Microsoft Windows.
- ix) Microsoft Word.
- x) Microsoft Excel.
- xi) Microsoft PowerPoint and Microsoft Access.
- xii) Introduction to internet and Networking.

#### d) Course Assessment

End of Semester Examination (70%).

Continuous Assessment Tests (15%).

Assignments (5%).

Practicals (10%).

#### ROLE OF IT IN SOCIETY

IT has a wide range of applications such as:-

1. It is applied in health to generate Computer Science Products such as X-ray machines, CT scan, MRI's.
2. It is applied in Security Sector to determine the number of soldiers needed to be distributed across the country.
3. It is applied in the ministry of agriculture to model best grades in fertilisers, to determine the best periods of the year to carry out farming.
4. In tourism IT is applied to determine or calculate the number of animals to be evacuated in a certain

5. It is also applied in education to calculate the number of staffs needed per school, the amount of budget to be allocated in each educational institution etc.
6. It is applied in Mining to locate the goldmines.

### CRISP-DM

1. Business Problem
2. Data Loading
3. Data Cleaning
4. EDA
5. Modelling
6. Evaluation
7. Deployment

# TOPIC 1

## Introduction to Information Technology For Statistics & Computers.

Information Technology; Refers to the use of computers, software, networks and related devices to collect, store, process, analyse and transmit information.

Computer; A Computer is an electronic device that accepts data (input), processes it, stores it, and produces output.

### Basic Computer terminology.

#### 1. Hardware.

Physical Components (CPU, Keyboard, Printer).

#### 2. Software.

Programs and applications (Windows, R, SPSS)

#### 3. Data.

Raw facts used for analysis (survey values, measurements) that have not yet processed.

#### 4. Information.

Processed data that is meaningful and useful.

#### 5. Input Devices.

Tools used to enter data into a Computer (e.g. Keyboard, Mouse).

#### 6. Output Devices.

Tools used to return information from the computer to the user. Examples Monitor, printer, speakers.

7. CPU (Central Processing Unit).  
The "brain" of the Computer. Contains:  
- ALU - Performs Mathematical operations.  
- CU - Controls instructions.
8. Memory.  
RAM - temporary Memory.  
ROM - Permanent Memory.
9. File.  
A document stored in a Computer (e.g., Excel file, SPSS dataset).
10. Network.  
Connected Computers sharing resources.
11. Internet.  
A global network of Connected Computers.
12. Database.  
An Organized Collection of data used heavily in statistics for storage and retrieval.
13. Malware.  
Harmful Software such as Viruses.
14. Operating System (OS).  
Software that Manages the Computer (e.g., Windows, Mac Os, Linux).

## HISTORY OF COMPUTING

### 1. Pre-Mechanical Age (Before 1600).

People used simple manual tools for Counting and Calculations.

Main tools:

- Abacus - First Counting tool
- Napier's Bones - helped Multiply and divide.
- Slide Rule - Used for Mathematical Calculations.

Key idea:

Humans used basic tools to make Calculation easier.

### 2. Mechanical Age (1600-1930)

Machines were developed using gears and moving parts.

Important inventions:

- Pascaline - added and Subtracted.
- Leibniz Calculator - Multiplied and divided.
- Jacquard Loom - Used punch cards (early idea of programming).
- Difference Engine & Analytical Engine - early computer designs by Charles Babbage.

• Ada Lovelace - Wrote the first Computer program

Key idea:

Mechanical Machines started to perform more complex calculations.

### 3. ElectroMechanical Age (1930-1945)

Machines used both electrical and mechanical parts.

Examples:

- Hollerith Machine - Used punch cards for data (used in Census).
- Mark I Computer - automatic calculator.

Key idea :

Electricity was introduced, making machines faster and more efficient.

#### 4. Electronic Age (1946-Present).

Modern computers developed using electronic components divided into 5 generations.

##### i) First generation (1946-1958)

- used vacuum tubes.
- very large and produced a lot of heat.
- Example: ENIAC.

##### ii) Second generation (1959-1964)

- used transistors.
- smaller, faster and more reliable.

##### iii) Third Generation (1965-1971)

- used Integrated Circuits (ICs).
- multiple components on one chip.
- cheaper and more powerful computers.

##### iv) Fourth Generation (1971-2010)

- used microprocessors.
- personal computers, laptops, computer networks.

##### v) Fifth Generation (2010-Present)

- Based on Artificial Intelligence (AI).
- Smartphones, smart devices, robots, self-driving cars.

Key idea:  
Computers became smaller, faster, cheaper  
and smarter.